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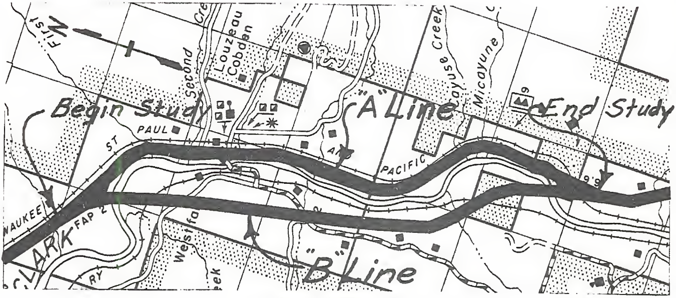
ENGINEERING REPORT
FOR
COMPARISON OF COSTS
OF
ALTERNATE LINES
ON
INTERSTATE ROUTE I-90

EAST OF SUPERIOR



PREPARED BY
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INTERSTATE DIVISION

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ENGINEERING REPORT FOR COMPARISON OF COSTS EAST OF SUPERIOR

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ENGINEERING REPORT FOR COMPARISON OF COSTS
ON INTERSTATE ROUTE I-90
EAST OF SUPERIOR

November 1, 1960

FOREWORD

This report has been prepared to compare the relative merits of two alternate locations from a point on the PTW approximately six miles southeast of Superior to a point on the PTW approximately three miles northwest of Tarkio. The factors evaluated were construction, maintenance, and operating costs.

LINE DESCRIPTIONS

One location considered ("B" Line) is approximately the line covered by the 108(d) and the 104(b) Estimates. This 5.79-mile, 2-lane section has moderate earthwork but includes two Clark Fork River crossings and three railroad separations.

The other location considered ("A" Line) follows the PTW for the length of the study. This 6.06-mile, 2-lane section includes one railroad separation and a considerable amount of earthwork, rip-rap, retaining wall, and channel modification of the Clark Fork River.

One interchange was included on each line to serve the Louzeau area and preserve the continuity of the local road system.

CONSTRUCTION COSTS

Both lines were estimated as 2-lane roadways with 10-foot shoulders. The estimated 1975 DHV is 500, so at-grade approaches were not considered. The terrain indicates that the design speed should be 60 mph.

Earthwork for both lines was computed from a centerline profile except for the critical portions of the "A" Line, where cross-sections were used.

10" of base, 2" of cushion, and a 4" plant-mix bituminous mat were used as appropriate base and surface courses for both lines.

Unit prices used were based on the 1959 Montana average low bid prices.

The costs of structures over the Clark Fork River and railroad separations were furnished by the Bridge Department. The costs of the interchange structures were estimated using average construction costs.

Detailed costs of these and other items are tabulated later in the report.

Total construction costs were broken down into annual costs using a 4% Capital Recovery Factor and estimated lives of 40 years for earthwork and engineering, 20 years for surfacing, 50 years for structures and right of way, and 30 years for all other items.

MAINTENANCE COSTS

Maintenance costs were estimated on an annual basis and are tabulated later in the report.

OPERATING COSTS

Road user costs were estimated on an annual basis using the adjusted average ADT for the next 20 years. Computations were based on the "Road User Benefit Analysis for Highway Improvements" manual, published by AASHO, using operating costs adjusted to current local prices.

CONCLUSIONS

This study reflects that:

1. Construction costs favor the "B" Line.
2. Maintenance costs favor the "A" Line.
3. Operating costs favor the "B" Line.

The summary of construction, maintenance, and operating costs favors the "B" Line by approximately $32,000 per year.

The "B" Line is therefore recommended and proposed by the Interstate Division for the further survey and development to construction contract on the basis of this study which indicates an economic savings of two-thirds of a million dollars over a 20-year period. In addition, all factors indicate that the cost of developing a future 4-lane highway on the "A" Line would be prohibitive, due to the lack of room between the Chicago, Milwaukee, St. Paul and Pacific Railroad and the Clark Fork River.

SUPERIOR EAST
SUMMARY OF ANNUAL COSTS

ITEM	ESTIMATED LIFE	4% CRF	"A" LINE		"B" LINE	
			TOTAL	ANNUAL	TOTAL	ANNUAL
Grade & Drain	40	.0505	$1,251,000	$ 63,200	$ 344,000	$ 17,400
Base & Surface	20	.0736	307,000	22,600	303,000	22,300
Structures	50	.0465	308,000	14,300	1,238,000	57,600
Right of Way	50	.0465	98,000	4,600	41,000	1,900
Engineering	40	.0505	290,000	14,600	293,000	14,800
Miscellaneous	30	.0578	89,000	5,100	93,000	5,400
Maintenance	--	--	--	9,100	--	11,700
Road User	--	--	--	669,500	--	639,700
TOTAL			$2,343,000	$803,000	$2,312,000	$770,800

SUPERIOR EAST
CONSTRUCTION COSTS "B" LINE
5.79 miles - 2-Lane

CLEAR & GRUB, 5.79 miles at $6,000	$ 35,000
EARTHWORK, 600,000 Cu. Yds. at $.45	270,000
DRAINAGE, 5.79 miles at $4,500	26,000
*GRADE & DRAIN FRONTAGE ROAD, 1.1 miles at $7,500	8,000
BASE & SURFACE, 5.79 miles at $44,000	255,000
*BASE & SURFACE FRONTAGE ROAD, 1.1 miles at $7,500	8,000
INTERCHANGE STRUCTURE, 120' at $400	48,000
GRADE & DRAIN RAMPS	40,000
BASE & SURFACE RAMPS	40,000
RAILROAD SEPARATIONS	390,000
CLARK FORK RIVER BRIDGES	800,000
GUARDRAIL, 0.6 miles at $17,000	10,000
FENCE, 11.58 miles at $3,000	35,000
SIGN INTERCHANGE	10,000
ROADWAY SIGNING, 5.79 miles at $500	3,000
SUBTOTAL	$1,978,000
PRELIMINARY ENGINEERING, (4.8% of Subtotal)	95,000
CONSTRUCTION ENGINEERING & CONTINGENCIES (10% of Subtotal)	198,000
RIGHT OF WAY & UTILITIES	41,000
TOTAL	$2,312,000

*The cost of 1.1 miles of frontage road costing $16,000 was included in this estimate rather than a separation at Station 600±, costing $40,000.

SUPERIOR EAST
CONSTRUCTION COSTS "A" LINE
6.06 miles - 2-Lane

CLEAR & GRUB, 4.0 miles at $3,000	$ 12,000
EARTHWORK, 980,000 Cu. Yds. $.65	637,000
CHANNEL EXCAVATION, 225,000 Cy. Yds. at $.50	112,000
RIP RAP, 20,000 Cu. Yds. at $5.00	100,000
RETAINING WALL, 67,000 Sq. Ft. at $5.00	335,000
DRAINAGE, 6.06 miles at $4,500	27,000
BASE & SURFACE, 6.06 miles at $44,000	267,000
INTERCHANGE STRUCTURE, 120' at $400	48,000
GRADE & DRAIN RAMPS, L. S.	40,000
BASE & SURFACE RAMPS, L. S.	40,000
RAILROAD SEPARATION	260,000
GUARDRAIL, 2.0 miles at $17,000	34,000
FENCE, 10.12 miles at $3,000	30,000
SIGN INTERCHANGE, L. S.	10,000
ROADWAY SIGNING, 6.06 miles at $500	3,000
SUBTOTAL	$1,955,000
PRELIMINARY ENGINEERING, (4.8% of Subtotal)	94,000
CONSTRUCTION ENGINEERING CONTINGENCIES, (10% of Subtotal)	196,000
RIGHT OF WAY & UTILITIES	98,000
TOTAL	$2,343,000

SUPERIOR EAST
ANNUAL MAINTENANCE COSTS

INTERSTATE 2-LANE --------- $1,500 per mile
PTW ----------------------- 500 per mile

"A" LINE

6.06 miles at $1,500 = $ 9,090

"B" LINE

5.79 miles at $1,500 = $ 8,685
6.10 miles at $500 = 3,050

TOTAL = $11,735

SUPERIOR EAST
ANNUAL ROAD USER COSTS

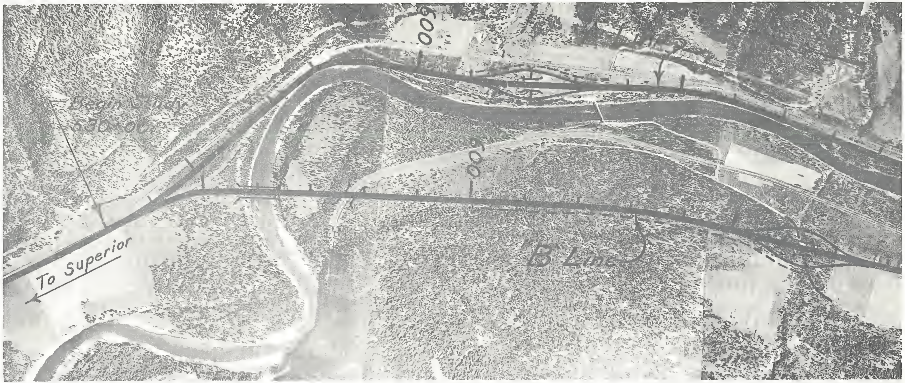
PRESENT ADT = 1630 Vehicles
FUTURE ADT = 3857 Vehicles
AVERAGE ADT = 2744 Vehicles
8% TRUCKS - Assume 1 truck equivalent to 3 cars
ADJUSTED AVERAGE ADT = 3183 Cars

"A" LINE

3183 X 6.06 X $.0951 X 365 = $669,549

"B" LINE

3183 X 5.79 X $.0951 X 365 = $639,718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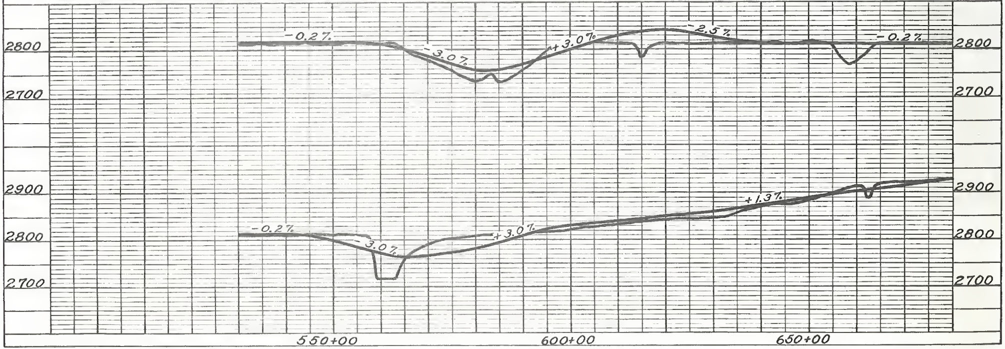
To Superior
"B" Line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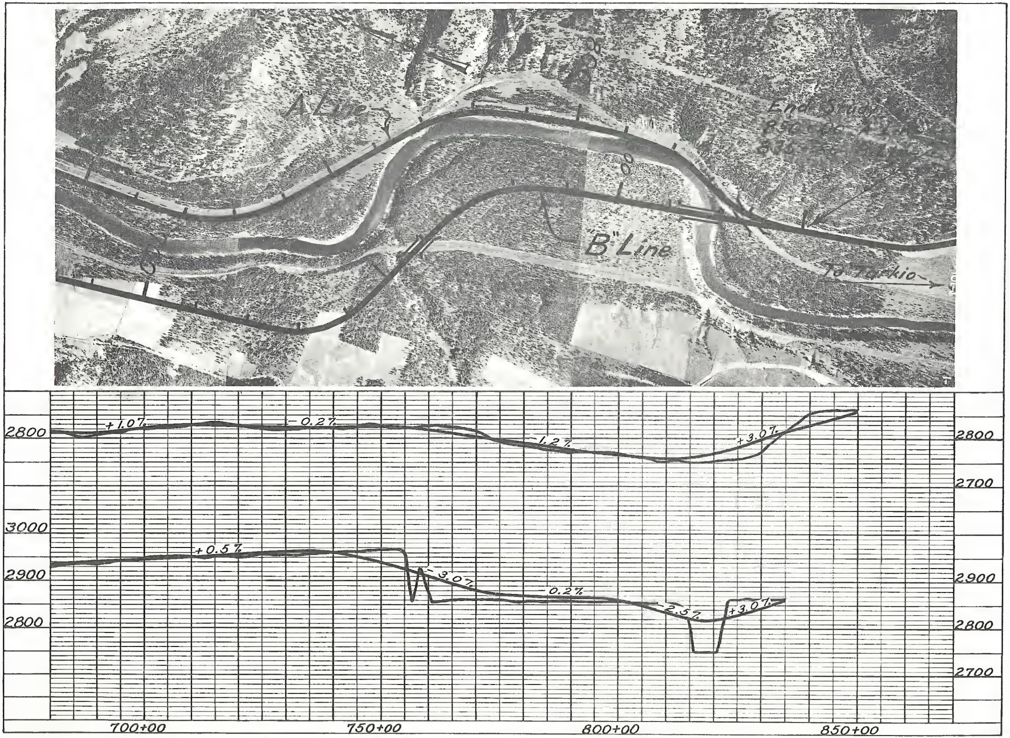
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